Title: Morfology and surface chemical composition of porous silicon prepared at various conditions

Author: Bc. Martin KONEČNÝ

Author's e-mail: konecmar@seznam.cz

Department: Department of Chemical Physics and Optics

Supervisor: Doc. RNDr. Juraj Dian, CSc.

Supervisor's e-mail: Juraj.Dian@mff.cuni.cz

Abstract:

Porous silicon is a silicon-based material prepared mainly by anodic etching of crystalline silicon in hydrofluoric acid. Physical and chemical properties of porous silicon are governed by structures with sizes of the order of ones to tens of nanometers. Properties of nanostructure material are affected – as compared to macroscopic counterparts – by quantum confinement effect and enormous internal surface. According to type of silicon substrate (type of dopant, conductivity, crystallographic orientation) and technological conditions a material with different mean size of pores (macro-, meso- and nanoporous silicon) and surface chemical composition (different ratio of Si-O and Si-H bond) can be prepared. Morphology and surface chemical composition predestinated application potential of porous silicon for sensors of chemical species by taking advantage of strong sensitivity of physical properties of silicon nanocrystals – especially of photoluminescence – on the chemical state of a surface. Detection of chemical species is an important task in environmental monitoring, control of chemical and biological processes and testing of food quality. Principal advantage of silicon-based sensors is the possibility of integration on silicon chip.

Keywords: nanostructured silicon, porous silicon, photoluminescence, functionalized nanomaterials, sensors